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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/819,952	03/29/2001	Toshiya Uemura	P 277993 F00-242-US	2938

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EXAMINER

BAUMEISTER, BRADLEY W

ART UNIT	PAPER NUMBER
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2815

DATE MAILED: 09/05/2002

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.
09/819,952

Applicant(s)
Uemura et al.

Examiner
B. William Baumeister

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on Jun 27, 2002
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-37 is/are pending in the application.
- 4a) Of the above, claim(s) 32-37 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-31 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- *See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s). 6 6) ☐ Other:

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DETAILED ACTION

Election/Restriction

1. Applicant's election without traverse of Invention I in Paper No. 9 is acknowledged.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 9, 11, 13, 16, 18 and 20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. These claims recite the limitation "said light transmission layer." As these claims ultimately depend from claim 2, there is insufficient antecedent basis for this limitation in the claims.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section

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122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or
(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

5. Claims 1, 8, 26, 28, and 30 are rejected under 35 U.S.C. 102(e) as being anticipated by Morita et al. '636. Morita discloses III-N light emitters formed on a sapphire substrate and having an emission layer 9. Morita discloses that the rear side of the sapphire substrate may further have a reflective film 11 composed of various metals such as gold (e.g., col. 5, line 14), or multilayer films of metal (e.g., col. 2, line 22). Morita further discloses that if the rear surface of the sapphire is not sufficiently smooth, a light transmissive smoothing film, which can be made of various materials such as SiO₂, can also be employed between the substrate and the reflector (col. 5, lines 18-23).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 6, 12, 14, 15, 19 and 24 rejected under 35 U.S.C. 103(a) as being unpatentable over Morita et al. '636 as applied to the claims above. Morita discloses all of the claimed

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elements, but does not appear to further disclose any potential thickness ranges for these layers such as the reflective layer, the light transmission layer or the substrate. Nonetheless, it would have been obvious to one of ordinary skill in the art at the time of the invention to have formed these respective layers to thicknesses that are within the very broadly claimed ranges because thicknesses within these ranges do not produce any unexpected results and also for the purpose of optimizing their respective effects for their respective intended uses. Further, Applicant's specification acknowledges that these claimed thicknesses do not produce any unexpected results, but rather, that the limitations are based on goals that were well known in the industry: if the layers were made thinner they would not adequately perform their intended functions, and if made thicker they would be unduly wasteful/costly (see e.g., specification paragraphs [0057] and [0059]. Also, since Morita is a US Patent, and the disclosure has a presumption of validity, and therefore the invention is presumed to operate as intended, the layers would therefore necessarily at least be thicker than the claimed minimum thicknesses or they would not work as intended. With regard to the larger thickness limit, minimizing material and processing costs was a well known industry goal at the time of the invention.

8. Claims 4, 6, 10, 12, 14, 15, 17, 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morita '636 as applied to the claims above, and further in view of Steigerwald GB '899.

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a. Morita discloses that various metals may be used for the substrate reflector, but does not expressly disclose that Al or Ag may be one of these metals.

b. Steigerwald discloses III-N LEDs 16 formed on a sapphire substrate 12 with a semitransparent contact (emission) layer (see FIG 1). On the backside of the sapphire substrate is formed a mirror structure composed of a reflective layer 14 that may be composed of various metals including Al, Ag or Au of thickness with in a range including about 50 - 250 nm (see FIG 4). More strictly the specification recites that the reflective layer has a lower thickness limit of about 20 nm for Ag and Al to ensure that the reflectivity is sufficient (page 5, lines 24-28). An optional non-absorbing adhesion layer 10 may also be interposed between the reflector 14 and the substrate. Any thickness (minimum thickness of one atomic layer) may be used for the adhesion layer so long as it promotes adhesion and does not reduce reflectivity (page 6, lines 10-16).

c. It would have been obvious to one skilled in the art at the time of the invention to have substituted either Al or Ag for the Au reflective layer of Morita because Steigerwald teaches that these metals are more highly reflective of certain III-N wavelengths and for the purpose of reducing manufacturing costs since Ag and especially Al are less expensive than gold.

9. Claims 2, 3, 5, 7, 9, 11, 13, 16, 18, 20-23, 25, 27, 29, and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over either Morita or alternatively Morita/Steigerwald as applied to the claims above, and further in view of Lester '839.

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a. Morita and Morita/Steigerwald teach all of the limitations of these claims as set forth above, except for the further limitations relating to the additional inclusion of a corrosion-resistant layer that can be composed of various metal oxides or ceramics formed on the reflector.

b. Lester teaches GaN-based LEDs having a reflective electrode 20 that can be composed of various metals such as Ag, Al, Rh, NiAu, Pd or TiPd, and which are of thicknesses on the order of 100 nm to 3 microns (col. 3). An encapsulant 22 is formed over the reflective metal electrode and may be composed of various metal oxides such as AlOx, HaOx or TiOx (col. 4). Lester teaches that this dielectric encapsulant provides various functions including (1) protecting the reflective metal from scratches and (2) protecting the metal reflector from environmental degradation, e.g. oxidation and tarnishing (or corrosion).

c. It would have been obvious to one of ordinary skill in the art at the time of the invention to have further employed a corrosion-resistant encapsulant layer as taught by Lester over the reflective metal layer 11 of Morita for either of the purposes of preventing the Morita reflector from becoming scratched or oxidized as taught by Lester.

d. Further regarding claims 22 and 23, setting forth that the thickness of the corrosion-resistant layer is between 5 nm and 10 microns, while Lester does not provide any examples of possible thickness ranges, as explained above in relation to the light-transmission layer, the claimed range is so broad that even if a device having an encapsulant formed according to Lester did not necessarily have a thickness within this range, it would have been obvious to have formed it to a thickness within this range for the well-known-in-the-art purpose of balancing

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the need to make it sufficiently thick so as to perform its intended function with the countervailing goal of making layers as thin as possible for improved miniaturization and minimization of costs.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a. Chiyo et al. '545 teaches a GaN emitter having buffer and clad layers, either or both of which can be labeled as "a substrate;" a reflective Ti layer 2; and a sapphire (Al_2O_3) substrate which can be labeled as a corrosion-resistant layer.

b. Nita '537 teaches GaN emitters with a conductive sapphire substrate and a rear-surface reflective metal electrode that may have an optional GaN contact (transparent) layer formed therebetween.

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INFORMATION ON HOW TO CONTACT THE USPTO

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to the examiner, **B. William Baumeister**, at **(703) 306-9165**. The examiner can normally be reached Monday through Friday, 8:30 a.m. to 5:00 p.m. If the Examiner is not available, the Examiner's supervisor, Mr. Eddie Lee, can be reached at (703) 308-1690. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956.

A handwritten signature in black ink, appearing to read 'B. William Baumeister', followed by the date '8/31/02'.

B. William Baumeister

Patent Examiner, Art Unit 2815

August 31, 2002